

## Two Stage Type High Speed Linear Servo Valves

Two stage type linear servo valves are a type of high-flow servo valve that has a direct type high-speed linear servo valve in its pilot stage to drive the main spool.

These valves control the positions of the pilot and main spools with electrical feedback, achieving high accuracy and response.

● **High flow**

The valves consist of two stages to provide a high flow rate [Rated flow at  $\Delta P = 7 \text{ MPa}$  (1020 PSI): 750 to 1500 L/min (198 to 396 U.S.GPM)].

● **High accuracy**

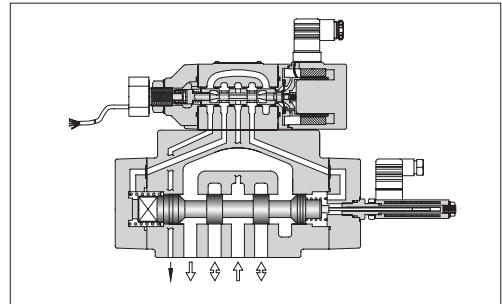
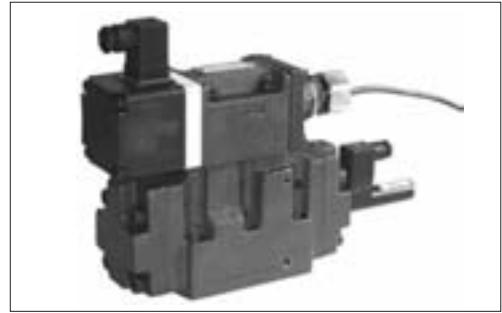
The valves have a low hysteresis of 0.1 % or less, achieving high accuracy. They allow the main unit to operate with much higher repeatability.

● **High response characteristics**

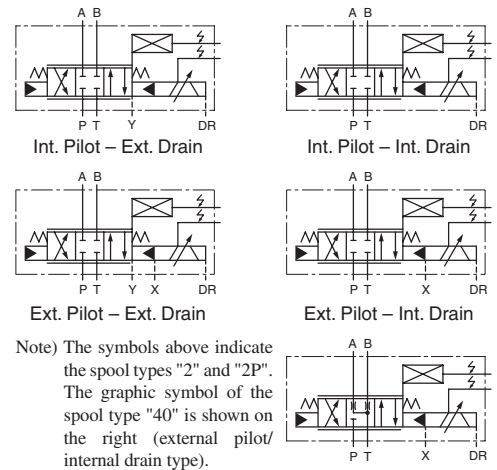
The valves provide significantly high levels of step and frequency responses, which are typically used as measures of response characteristics; the step response is 8 ms ( $0 \leftrightarrow 100 \%$ ), and the frequency response is 100 Hz/- 90° ( $\pm 25 \%$  amplitude) (Representative values for LSVHG-10-1500). Thus, the valves ensure the achievement of unprecedented high response.

● **Excellent contamination resistance**

As is the case with the direct type linear servo valves, the permissible level of fluid contamination for these valves is up to NAS 1638 class 10.



Graphic Symbols



■ **Model Number Deignation**

F-	LSVHG	-06	-900	-2P	-E	T	-R	-10
Special Seals	Series Number	Valve Size	Rated Flow @ $\Delta P = 7 \text{ MPa}$ (@ $\Delta P = 1020 \text{ PSI}$ )	Spool Type	Pilot Connection	Drain Connection	Cable Departure Direction	Design Number
<b>F:</b> Special Seals for Phosphate Ester Type Fluid (Omit if not required).	<b>LSVHG:</b> Two Stage Type High Speed Linear Servo Valves	<b>04</b>	<b>750:</b> 750 L/min (198 U. S. GPM)	<b>2:</b> 10 % Overlap 	<b>None:</b> Internal Pilot  <b>E:</b> External Pilot	<b>None:</b> External Pilot  <b>T:</b> Internal Pilot	(Viewed from the linear motor side)  <b>None:</b> Upper (Standard)  <b>R:</b> Right  <b>L:</b> Left	<b>10</b>
		<b>06</b>	<b>900:</b> 900 L/min (238 U. S. GPM) <b>1300:</b> 1300 L/min (343 U. S. GPM)	<b>40:</b> Open Centre A, B & T 				<b>10</b>
		<b>10</b>	<b>1500:</b> 1500 L/min (396 U. S. GPM)	<b>2P:</b> Zero Lap  (Dual Flow Gain)				<b>10</b>

## Specifications

The specifications below are for use with a DC 48 V type exclusive amplifier; for use with a DC 24 V type amplifier, see the values in parentheses { }.

Model Numbers		LSVHG-04-750	LSVHG-06-900	LSVHG-06-1300	LSVHG-10-1500		
Description							
Rated Flow	$\Delta P = 7 \text{ MPa (1020 PSI)}$ (4-Way Valve)	750 L/min {198 U. S. GPM}	900 L/min {238 U. S. GPM}	1300 L/min {343 U. S. GPM}	1500 L/min {396 U. S. GPM}		
	$\Delta P = 0.5 \text{ MPa (73 PSI)}$ (Per Land)	283 L/min {74.8 U. S. GPM}	340 L/min {89.8 U. S. GPM}	490 L/min {129 U. S. GPM}	600 L/min {159 U. S. GPM}		
Max. Operating Pressure		35 MPa (5080 PSI)	35 MPa (5080 PSI)	31.5 MPa (4570 PSI)	31.5 MPa (4570 PSI)		
Proof Pres. at Return Port	External Drain	31.5 MPa (4570 PSI)	35 MPa (5080 PSI)	25 MPa (3630 PSI)	21 MPa (3050 PSI)		
	Internal Drain <sup>(1)</sup>						
Drain Port (DR Port) Permissible Back Pressure <sup>(2)</sup>		0.05 MPa (7 PSI)					
Pilot Pressure <sup>(3)</sup>		1.5 - 35 MPa (220 - 5080 PSI)			1.5 - 25 MPa (220 - 3630 PSI)		
Pilot Flow Rate <sup>(4)</sup> L/min (U. S. GPM)		27 (7.1) or more {22 (5.8)} or more	30 (7.9) or more {24 (6.3)} or more	34 (9.0) or more {27 (7.1)} or more	30 (7.9) or more {30 (7.9)} or more		
Max. Leakage $P_s = P_p = 14 \text{ MPa}$ (2030 PSI) @ Viscosity: 32 mm <sup>2</sup> /s (150 SSU)	Pilot Valve		1.7 L/min (.45 U.S. GPM)				
	Main Valve	Spool Type	- 2 -	0.8 L/min (.21 U. S. GPM)	0.9 L/min (.24 U. S. GPM)	1 L/min (.26 U. S. GPM)	3 L/min (.79 U. S. GPM)
			- 40 -	1.6 L/min (.42 U. S. GPM)	1.8 L/min (.48 U. S. GPM)	2 L/min (.53 U. S. GPM)	6 L/min (1.59 U. S. GPM)
			- 2P -	6.8 L/min (1.80 U. S. GPM)	7 L/min (1.85 U. S. GPM)	8 L/min (2.11 U. S. GPM)	10 L/min (2.64 U. S. GPM)
Hysteresis		0.1 % or less					
Step Response (0 ↔ 100 %, Typical) <sup>(5)</sup>		8 ms {10 ms}	8 ms {10 ms}	10 ms {13 ms}	8 ms {8 ms}		
Frequency Response (± 25 % Amplitude, Typical) <sup>(5)</sup>	Gain: - 3 dB	150 Hz {140 Hz}	160 Hz {130 Hz}	150 Hz {110 Hz}	160 Hz {150 Hz}		
	Phase: - 90°	110 Hz {100 Hz}	105 Hz {100 Hz}	100 Hz {100 Hz}	100 Hz {100 Hz}		
Vibration Proof <sup>(6)</sup>		Frequency: 10 - 60 Hz, Amplitude: 4 mm (.157 in.), Acceleration: 7.8 - 282 m/s <sup>2</sup> (25.6 to 925 ft./s <sup>2</sup> ) Frequency: 61 - 2000 Hz, Amplitude: 4 - 0.0038 mm (.157 - .00015 in.), Acceleration: 294 m/s <sup>2</sup> (965 ft./s <sup>2</sup> )					
Protection		IP 64					
Ambient Temperature		- 15 to + 60 °C (5 to 140°F)					
Spool Stroke to Stops		± 5 mm (± .197 in.)	± 5 mm (± .197 in.)	± 7 mm (± .276 in.)	± 5 mm (± .197 in.)		
Spool End Area		7.1 cm <sup>2</sup> (.011 Sq. in.)	8 cm <sup>2</sup> (.012 Sq. in.)	8 cm <sup>2</sup> (.012 Sq. in.)	8 cm <sup>2</sup> (.012 Sq. in.)		
Linear Motor Specification	Current	2 A [Max. 6 A]					
	Coil Resistance	4.5 Ω [at 20 °C (68 °F)]					
Mass		12 kg (26.5 lbs.)	20 kg (44.1 lbs.)	21 kg (46.3 lbs.)	54 kg (119 lbs.)		
Applicable Servo Amplifier		AMLS-C2-D*-*-10	AMLS-C-D*-*-10	AMLS-D-D*-*-10	AMLS-C-D*-*-10		

Note: (1) Pressure at the return port should be at actual supply pressure or less.

(2) Back pressure at the drain port should be 0.05 MPa (7 PSI) or less and not be a negative pressure.

(3) Supply pressure for the pilot valve should be 1.5 to 35 MPa (220 to 5080 PSI) {1.5 to 25 MPa (220 to 3630 PSI) for LSVHG-10} and should also be 60 % of actual supply pressure or more.

(4) The pilot flow is calculated based on 14 MPa (2030 PSI) of pilot pressure and the above step response.

(5) This value is measured for each valve based on 14 MPa (2030 PSI) of pilot pressure; it may differ depending on the actual circuit/operation conditions.

(6) There are restrictions on the mounting position; consult Yuken for details.

